

REMARKS

Applicants respectfully request reconsideration of this application as amended. Claims 1-5, 8, and 28-37 are pending in the application. Claims 1-5, 8 and 28-34 have been rejected.

Claims 1, 5, and 35 have been amended. No new matter has been added.

Claim Rejections - 35 U.S.C. § 112

The Examiner has rejected claims 5, 8, and 35-37 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Support for a "solvent vapor supply means" in claim 5 can be found in at least paragraphs [0006], [0024]-[0026], and Figures 1-4. Paragraph [0024] describes a solvent-rich environment being maintained within the perimeter drain 250 and the recovery drain 255 of Figures 2 and 3. A weeping seal 150 dispenses a solvent along the inner surface of the bowl 120 as illustrated in Figure 1. Paragraph [0006]. A weeping seal 450 dispenses a solvent along the inner surface of the bowl 420 as illustrated in Figure 4. amended Paragraph [0025]. The solvent proceeds down the recovery drainpipe 455. The weeping seals 150 and 450 are examples of structure that provide support for the phrase "solvent vapor supply means" in claim 5.

The Examiner indicates that claim 5 lacks a proper antecedent basis for "the recovery drainpipe." Claim 5, as amended, includes the phrase "a recovery drainpipe." It is submitted the amended claim 5 has a proper antecedent basis for the phrase "a recovery drainpipe."

The Examiner indicates that claims 35 and 8 are confusing because it is unclear how the perimeter drain relates to the additional perimeter drains.

Regarding claim 35, the perimeter drain and the additional drains are formed in the same bowl. However, these drains are separate from each other as indicated by the limitation "one or more additional perimeter drains formed within the bowl to enable the separate recovery of one or more additional types of photoresists .."

Regarding, dependent claim 8 and independent claim 1, again the perimeter drain and the additional drains are formed in the same bowl. However, these drains are separate from each other as indicated by the limitation "one or more additional perimeter drains formed within the bowl to recover one or more additional types of photoresists in corresponding photoresist recovery containers." Each drain is coupled to a separate recovery container. Applicants respectfully submit that claims 35 and 8 are clear and unambiguous.

For the reasons stated above, applicants respectfully request withdrawal of the rejections of claims 5, 8, and 35 under 35 U.S.C. §112, second paragraph.

Given that dependent claims 36 and 37 depend upon claim 35 and have not been rejected for other reasons, applicants respectfully request withdrawal of the rejections of claims 36 and 37 under 35 U.S.C. §112, second paragraph.

Claim Rejections - 35 U.S.C. § 103

The Examiner has rejected claims 1, 8, 28-30, and 34-36 under 35 U.S.C. 103(a) as being unpatentable over Yamauchi et al. (U.S. Patent Application No. 2002/0112662) hereinafter "Yamauchi" in view of Applicant's Admitted Prior Art Teaching and Yamasaka (U.S. Patent No. 5,997,653) hereinafter "Yamasaka."

Claim 1, as amended, reads as follows.

A system for photoresist recovery comprising:
a nozzle to dispense a photoresist;
a bowl having an interior region and an interior surface;

a wafer platform disposed within the interior region of the bowl;
a wafer spindle coupled to the wafer platform, the wafer spindle to spin the wafer platform to propel an excess amount of photoresist deposited upon a wafer placed upon the wafer platform to the interior surface of the bowl;
a photoresist recovery container;
a perimeter drain formed within the bowl by extending around the perimeter of the bowl such that the excess amount of photoresist propelled from the wafer proceeds through the perimeter drain to the photoresist recovery container; wherein the perimeter drain comprises a concave conduit for reducing the surface area contacting the photoresist being recovered; and
a weeping seal to permit a wash solvent to wash the excess amount of photoresist propelled from the wafer through the perimeter drain to the photoresist recovery container.

Applicant's invention relates to a system for photoresist recovery comprising: a wafer spindle coupled to the wafer platform, the wafer spindle to spin the wafer platform to propel an excess amount of photoresist deposited upon a wafer placed upon the wafer platform to the interior surface of the bowl; a photoresist recovery container; and a perimeter drain formed within the bowl by extending around the perimeter of the bowl such that the excess amount of photoresist propelled from the wafer proceeds through the perimeter drain to the photoresist recovery container; wherein the perimeter drain comprises a concave conduit for reducing the surface area contacting the photoresist being recovered; and a weeping seal to permit a wash solvent to wash the excess amount of photoresist propelled from the wafer through the perimeter drain to the photoresist recovery container.

Applicants recognize that as solvents evaporate from the recoverable photoresist, the photoresist viscosity increases and the photoresist begins to harden and deposit onto the walls of the drain and other structures. This reduces the amount of photoresist that can be recovered and increases the particulates in

the recovered photoresist. Therefore, by reducing the surface area contacting the photoresist, evaporation rates of solvents are reduced.

Yamauchi discloses in FIG. 1 a sectional view showing a waste fluid separating cup 34 of a photoresist coating apparatus. The photoresist coating apparatus is a spin coater which is used to coat a photoresist on a substrate in photolithographic processing, which is a part of a process by which a semiconductor IC is fabricated. A substrate 21 is supported so as to be movable in a vertical direction from a coating position 22 to a rinsing position 23. A lower cup 14 includes a main body 14A and an extending portion 14B which extends inward from an upper portion of the main body 14A. The main body 14A is provided with two grooves: an outer groove that is a photoresist waste fluid groove 19, and an inner groove that is a rinse waste fluid groove 20. The photoresist waste fluid groove 19 and the rinse waste fluid groove 20 are partitioned by a partition 18 which is disposed lower than an outer wall 14C of the lower cup 14. The photoresist waste fluid groove 19 and the rinse waste fluid groove 20 are respectively provided with a waste fluid port, and a waste fluid hose is connected to each of the waste fluid ports. The photoresist waste fluid and the rinse waste fluid are passed through the respective waste fluid hoses to be stored in separate waste fluid tanks. See Yamauchi, paragraphs [0024]-[0026] and [0027].

The grooves 19 and 20 have large surface areas that contact the waste resist, greatly evaporating its solvent. Yamauchi appears to disclose a solvent rinse for removing the backside bead, but neither the resist nor the solvent is recovered, it is all directed to the waste drain. The grooves 19 and 20 in figures 1 and 2 and the exhaust ducts 38 and 41 in Figure 3 extend vertically below the cup 34.

In contrast, Yamauchi fails to teach or suggest a system for photoresist recovery that includes a perimeter drain formed within a bowl by extending around the perimeter of the bowl because Yamauchi discloses waste grooves 19 and 20 disposed vertically below the cup 34 for storing resist waste. Yamauchi fails to teach or suggest the limitations "a perimeter drain formed within a bowl by extending around the perimeter of the bowl such that the excess amount of photoresist propelled from the wafer proceeds through the perimeter drain to the photoresist recovery container; wherein the perimeter drain comprises a concaved conduit for reducing the surface area contacting the photoresist being recovered" as recited in amended claim 1.

Therefore, Yamauchi does not teach or suggest the limitations stated in amended claim 1.

Adding the teachings of Applicant's Admitted Prior Art Teaching to Yamauchi fails to cure Yamauchi's deficiencies. Applicant's Admitted Prior Art Teaching discloses a bowl 120, weeping seal 150, drainpipe 135, and waste receptacle 140.

By contrast, Applicant's Admitted Prior Art Teaching fails to teach or suggest a system for photoresist recovery that includes a perimeter drain formed within a bowl by extending around the perimeter of the bowl because Applicant's Admitted Prior Art discloses the waste drainpipe 135 disposed vertically below the bowl 120 for storing resist waste. Applicant's Admitted Prior Art fails to teach or suggest the limitations "a perimeter drain formed within a bowl by extending around the perimeter of the bowl such that the excess amount of photoresist propelled from the wafer proceeds through the perimeter drain to the photoresist recovery container; wherein the perimeter drain comprises a concaved conduit for

reducing the surface area contacting the photoresist being recovered" as recited in amended claim 1.

Therefore, Applicant's Admitted Prior Art Teaching does not disclose or suggest the limitations stated in amended claim 1.

Adding the teachings of Yamasaka to Yamauchi fails to cure Yamauchi's deficiencies. Yamasaka discloses a method for washing and drying a substrate. As shown in FIG. 3, the cup 20 has a double cup structure including an inner cup 21 having a receiving port 21a and an outer cup 22 having a receiving port 22a and is supported by a lift mechanism 23 so as to be movable in a vertical direction. The receiving port 22a of the outer cup 22 is positioned immediately above the receiving port 21a of the inner cup 21. These inner and outer cups 21, 22, which are concentric with each other, communicate with a common exhaust path 24 formed below these cups so as to permit the atmosphere within these cups to be discharged to the outside through the common exhaust path 24. These inner and outer cups 21, 22 also communicate with drain pipes 25, 26, respectively, formed below these cups so as to permit the waste solution to be discharged to the outside through these drain pipes 25, 26.

By contrast, Yamasaka fails to teach or suggest a system for photoresist recovery that includes a perimeter drain formed within a bowl by extending around the perimeter of the bowl because Yamasaka discloses the cups 21 and 22 and waste drainpipes 25 disposed vertically below the cup 20 for removing waste solution. Yamasaka fails to teach or suggest the limitations "a perimeter drain formed within a bowl by extending around the perimeter of the bowl such that the excess amount of photoresist propelled from the wafer proceeds through the perimeter drain to the photoresist recovery container;" wherein the perimeter drain

comprises a concaved conduit for reducing the surface area contacting the photoresist being recovered" as recited in amended claim 1.

Therefore, Yamasaka does not teach or suggest the limitations stated in amended claim 1.

It is respectfully submitted that Yamauchi does not teach or suggest a combination with Applicant's Admitted Prior Art, and Applicant's Admitted Prior Art Teaching does not suggest a combination with Yamauchi. It would be impermissible hindsight to combine Yamauchi with Applicant's Admitted Prior Art Teaching based on applicants' own disclosure.

It is respectfully submitted that Yamauchi does not suggest a combination with Yamasaka, and Yamasaka does not suggest a combination with Yamauchi. It would be impermissible hindsight to combine Yamauchi with Yamasaka based on applicants' own disclosure.

Furthermore, even if Yamauchi, Applicant's Admitted Prior Art Teaching, and Yamasaka were combined, such a combination would lack the limitations "a perimeter drain formed within a bowl by extending around the perimeter of the bowl such that the excess amount of photoresist propelled from the wafer proceeds through the perimeter drain to the photoresist recovery container; wherein the perimeter drain comprises a concaved conduit for reducing the surface area contacting the photoresist being recovered." (claim 1).

Therefore, in view of the above distinction, neither Yamauchi nor Applicant's Admitted Prior Art Teaching nor Yamasaka, individually or in combination, teach or suggest each and every limitation of claim 1. As such, amended claim 1 is not rendered obvious by Yamauchi in view of Applicant's Admitted Prior Art Teaching and Yamasaka under 35 U.S.C. § 103(a).

Independent claims 35, as amended, contains similar limitations but not identical. Furthermore, amended claim 35 includes the limitation "one or more additional perimeter drains formed within the bowl to enable the separate recovery of one or more additional types of photoresists, which enables the system to change photoresist types while in production, thus reducing down time for photoresist changing operations." Neither Yamauchi nor Applicant's Admitted Prior Art Teaching nor Yamasaka, individually or in combination, teach or suggest this limitation. Yamauchi teaches a resist waste groove 19 and a rinse waste fluid groove 20. Applicant's Admitted Prior Art Teaching discloses a single waste drainpipe 135. Yamasaka teaches removal of a waste solution.

For the reasons stated above, independent claim 35 is not rendered obvious by Yamauchi in view of Applicant's Admitted Prior Art Teaching and Yamasaka under 35 U.S.C. § 103(a).

It is submitted that claims 8, 28-30, 34, and 36 are not rendered obvious by Yamauchi in view of Applicant's Admitted Prior Art Teaching and Yamasaka under 35 U.S.C. § 103(a) given that claims 8, 28-30, 34, and 36 depend from and include the limitations of one of the corresponding independent claims 1 and 35.

The Examiner has rejected claims 31-33 under 35 U.S.C. 103(a) as being unpatentable over Yamauchi in view of Applicant's Admitted Prior Art Teaching and Curtiss et al. (U.S. Patent No. 6,740,163) hereinafter "Curtiss".

Claims 31-33 depend from and include the limitations of independent claim 1 noted above. It is submitted that Curtiss fails to cure the deficiencies of Yamauchi in view of Applicant's Admitted Prior Art Teaching noted above with respect to claim 1 and, therefore, claims 31-33 are patentable over the combination of cited references.

The Examiner has rejected claim 5 under 35 U.S.C. 103(a) as being unpatentable over Yamauchi in view of Applicant's Admitted Prior Art Teaching and Kimura et al. (U.S. Patent No. 5,711,809) hereinafter "Kimura".

Claim 5 depends from and include the limitations of independent claim 1 noted above. It is submitted that Kimura fails to cure the deficiencies of Yamauchi in view of Applicant's Admitted Prior Art Teaching noted above with respect to claim 1 and, therefore, claim 5 is patentable over the combination of cited references.

The Examiner has rejected claim 3 under 35 U.S.C. 103(a) as being unpatentable over Yamauchi in view of Applicant's Admitted Prior Art Teaching and Chiu et al. (U.S. Patent No. 6,807,972) hereinafter "Chiu".

Claim 3 depends from and include the limitations of independent claim 1 noted above. It is submitted that Chiu fails to cure the deficiencies of Yamauchi in view of Applicant's Admitted Prior Art Teaching noted above with respect to claim 1 and, therefore, claim 3 is patentable over the combination of cited references.

The Examiner has rejected claims 3, 4, and 37 under 35 U.S.C. 103(a) as being unpatentable over Yamauchi in view of Applicant's Admitted Prior Art Teaching and Nakamori et al. (U.S. Patent No. 6,589,338) hereinafter "Nakamori".

Claims 3, 4, and 37 depend from and include the limitations of one of the corresponding independent claims 1 and 35 noted above. It is submitted that Nakamori fails to cure the deficiencies of Yamauchi in view of Applicant's Admitted Prior Art Teaching noted above with respect to claims 1 and 35 and, therefore, claims 3, 4, and 37 are patentable over the combination of cited references.

CONCLUSION

Applicant respectfully submits that the present application is in condition for allowance. If the Examiner believes a telephone conference would expedite or assist in the allowance of the present application, the Examiner is invited to call Mr. Jeremy Schweigert at (408) 720-8300.

Pursuant to 37 C.F.R. 1.136(a)(3), applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: November 5, 2007

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